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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/842,315	04/26/2001	Taketomi Asami	0756-2306	5664

7590 11/03/2003

ROBINSON INTELLECTUAL PROPERTY LAW OFFICE
PMB 955
21010 SOUTHBANK STREET
POTOMAC FALLS, VA 20165

EXAMINER	
BLUM, DAVID S	
ART UNIT	PAPER NUMBER

2813

DATE MAILED: 11/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/842,315

Applicant(s)

ASAMI ET AL.

Examiner

David S Blum

Art Unit

2813

MW

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 May 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

Art Unit: 2813

This action is in response to amendments D and E, papers #19 and 20, filed 05/12/03 and 05/27/03.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Teramoto (US 5,773,325) in view of Varhue (US 6,313,017), Wasserman (US006221766B1) and Lampert (US005181985A) and Wolf (page 516).

Teramoto teaches all of the positive steps of claims 1-15 except for in-situ cleaning of the semiconductor film and etch cleaning while spinning the substrate and for forming a thin oxide film by applying water in which ozone is dissolved (rinsing surfaces with pure water containing ozone). Teramoto teaches forming an amorphous silicon film (304) on a base film, the amorphous film is recrystallized and patterned (thus forming an island shape), and forming a gate insulating film (305) on the crystalline film.

Varhue teaches that silicon films and substrates must be cleaned of contamination impurities (cleaning or removing material is etching) and does this in an acid containing

Art Unit: 2813

fluorine (as in claims 13 and 14) and preferably (in-situ) in a load-lock chamber which will avoid exposure to the (clean room air) atmosphere and allow the next layer to be formed (column 5 lines 10-25). Varhue also teaches that if the film is exposed to oxygen atmosphere, it must be recleaned (in-situ) prior to forming the next layer.

Wasserman teaches etching equipment for removing unwanted particles includes a rotatable support for spinning the substrate under a supply of etching solution (column 2 lines 5-10), thus applying an etching solution while spinning the substrate. This method will increase throughput and reduces particulate contamination (column 2 lines 16-20).

Varhue does not recite which impurities are removed in their cleaning processes. The applicant, on page 2, first paragraph of the summary of the invention, states that semiconductor devices are usually produced in clean rooms, but that filters generate impurities (particularly boron) as part of operation (as in claims 13 and 14). Therefore it is inherent to semiconductor fabrication that boron is one of the impurity contaminants on a substrate. Further, the applicant states that if a human being is in the clean room (conventional practice), sodium will be a common impurity contaminant (as in claims 13 and 14). As Varhue teaches cleaning the substrate by the same process as the applicant, and boron and sodium are intrinsically contaminate the substrate, it is obvious that the same chemicals would remove these impurities from the substrate in Varhue as in the instant application (claims 13-14).

Art Unit: 2813

It would be obvious to one skilled in the requisite art at the time of the invention to modify Teramoto by including cleaning the film surface as suggested by Varhue (to be a standard semiconductor procedure) and to include etching/cleaning the substrate by a spin method to increase throughput (Wasserman) to produce a device without unwanted impurities (Teramoto column 4 lines 19-21, Varhue column 5 lines 10-12, Wasserman column 2 lines 16-20).

Regarding claims 6, 8, 10, 12, and 15, Lampert rinses wafer surfaces with pure water containing ozone (column 2 line 56). Lampert teaches impurities must be removed to improve CVD oxidation, epi and polysilicon deposition.

Wolf (page 516) teaches the conventional RCA method of cleaning wafers. The surface is rinsed with hydrogen peroxide. This creates a thin hydrous oxide film that is then removed by HF (hydrofluoric acid, an etchant comprising fluorine). The addition of oxygen, ozone or O₂, does not remain separate in water, but rather reacts to form hydrogen peroxide. The examiner states that this is an inherent chemical reaction. Thus the ozone containing water of Lampert produces hydrogen peroxide of Wolf. Therefore, the rinsing step of Lampert would form this thin film oxide even though Lampert is silent to the issue. The ratios of H₂O-NH₄OH-H₂O₂ at 5:1:1 reflects an excess oxygen content of greater than 6mg/liter as in claims 6, 8, 10, and 12.

Art Unit: 2813

It would be obvious to one skilled in the requisite art at the time of the invention to modify the surface by rinsing with ozone/water as known in the art and suggested by Lampert (to be a standard semiconductor procedure) with reasonable expectation of producing device without unwanted impurities (Teramoto column 4 lines 19-21, Varhue column 5 lines 10-12, Wasserman column 2 lines 16-20, Lampert Background).

Response to Arguments

3. Applicant's arguments with respect to claims 1-15 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

Art Unit: 2813


extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David S. Blum whose telephone number is (703)-306-9168 and e-mail address is David.blum@USPTO.gov.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr., can be reached at (703)-308-4940. Our facsimile number for Before-Final Communications is (703)- 872-9318 and for After-Final Communications is (703)- 872-9319. The facsimile number for customer service is (703)-872-9317. Our receptionist's number is (703)-308-0956.

David S. Blum

October 22, 2003


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800